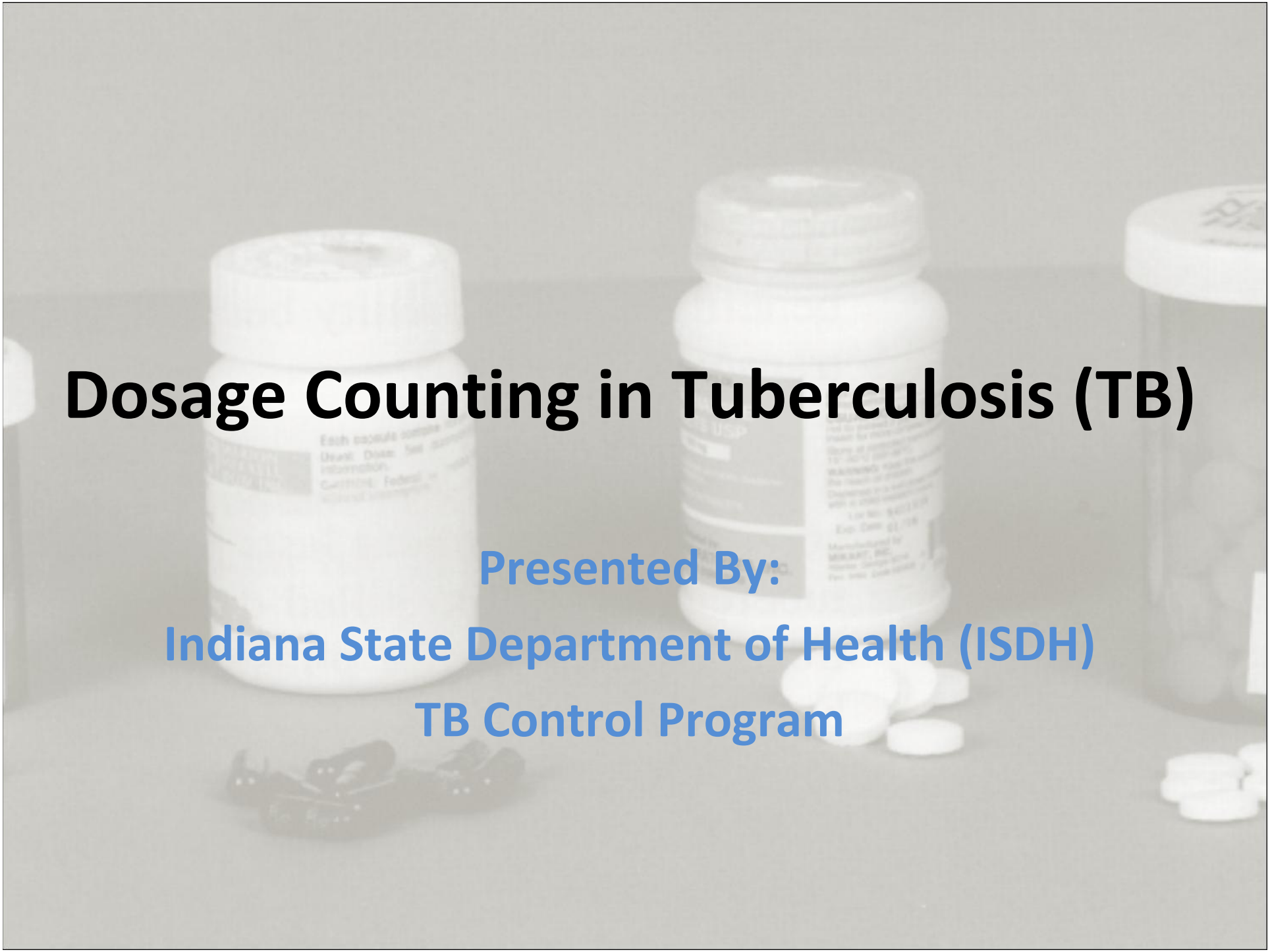

Dosage Counting in Tuberculosis (TB)

Presented By:

Indiana State Department of Health (ISDH)

TB Control Program

Objective

To increase participants' ability to count doses and when to consider treatment completed by:

- Describing dosage counting for treatment
- Practicing dosage counting in real life situations

True or False

1. Treatment completion is defined by the number of doses ingested, as well as the duration of treatment administration
2. There are two phases of treatment, the initial and the continuation phase
3. The initial phase of treatment is always two months duration
4. The continuation phase of treatment varies

True or False

5. Directly observed therapy (DOT) is only used for active cases
6. Family members can do DOT
7. Patients can split doses throughout the day

Latent Tuberculosis Infection (LTBI)

Front

Screening for Tuberculosis and Treatment of Latent TB Infection (LTBI)

Indiana State Department of Health

Tuberculosis Control Program
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Indianapolis, IN 46204
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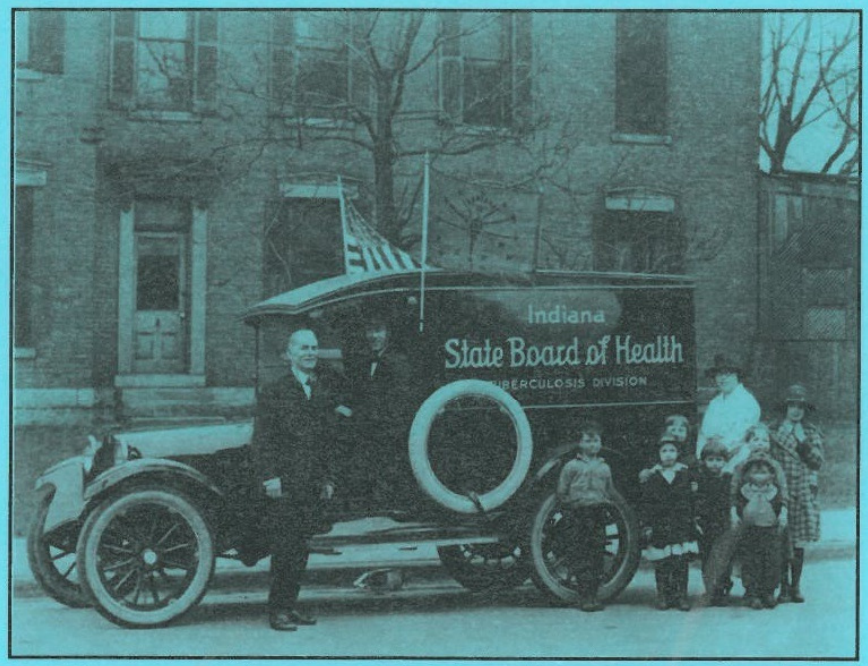


Remember – To test is to treat!!
www.TB.In.gov

Latent Tuberculosis Infection (LTBI)

Back

Recommended Treatment Regimens for LTBI

- ✓ **INH daily or twice weekly for 9 months**: preferred regimen for all patients regardless of age or HIV status. DOT must be used for twice-weekly therapy; safe to use with NRTIs, NNRTIs, and protease inhibitors. Must complete 270 daily or 76 twice-weekly doses within 12 months.
- ✓ **INH daily or twice weekly for 6 months**: use only if the preferred regimen is not feasible. Not indicated for children or for patients who are HIV-infected or who have fibrotic lesions. Must complete 180 daily or 52 twice-weekly doses within 9 months.
- ✓ **RIF daily for 4 months (adults) 6 months (children)**: alternate regimen if the preferred regimen cannot be used. May be used for patients who are contacts to INH-resistant, RIF-susceptible TB. Adults must complete 120 doses within 6 months. Children must complete 180 doses within 9 months. Bi-weekly therapy only recommended for adults.

Abbreviations: INH = isoniazid, RIF = rifampin, NRTIs = nucleoside reverse transcriptase inhibitors, NNRTIs = non-nucleoside reverse transcriptase inhibitors

Dosages

Adult
INH: 5 mg/kg (300 mg max) daily; 15 mg/kg (900 mg max) twice weekly;
RIF: 10 mg/kg (600 mg max) daily or twice weekly;

Children
INH: 10-15 mg/kg (300 mg max) daily; 20-30 mg/kg (900 mg max) twice weekly
RIF: 10-20 mg/kg (600 mg max) daily

INH liquid is commercially available but is not well tolerated by many children and is not generally recommended.

1/09

Highest Priority in a Tuberculosis Control Program

- Identification, evaluation and treatment of new cases
- Identification, evaluation and treatment of contacts
- Identification and treatment of high risk infected people

(Centers for disease control and prevention [CDC], 2009, p. 2)

In a TB ELIMIINATION Effort

- Increased emphasis on finding high risk infected people (targeted testing) and providing treatment,
- Increased emphasis on preventing the uninfected from becoming infected, and
- Increased emphasis on TB awareness

(CDC, 2009, p. 2)

Case Study #1 (LTBI)

Homer Duggin, cousin of active case Goober Duggin. TST was 8 mm, CXR was normal, and signs and symptoms were non existent. Homer is a heavy drinker and works at a local café as a dishwasher. He is U.S. born and has not traveled outside of the US.

Case Study #1 (LTBI)

LTBI Treatment script

Name: Homer Duggin

Date: 5/11/2009

INH 300 mg po qd x 9 mos.

or 30 pills refill x 8

Vit. B_6 50 mg po qd x 9 mos.

Case Study #1 (LTBI)

Start date: May 11, 2009

Homer Duggin is to come to the HD monthly for evaluations and refill meds not on DOT

Case Study #1 (LTBI)

Comes to HD: June 8, 2009

July 6, 2009

August 3, 2009 no show

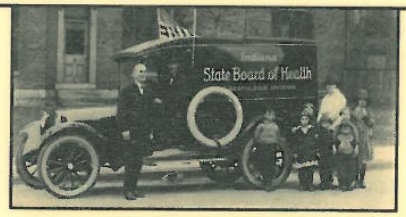
August 19, 2009 comes to HD (Homer Duggin stated he did not take meds from August 3 – 19, 2009)

Homer Duggin comes as scheduled after that

When should he complete treatment for LTBI?

Tuberculosis (TB)
Front

Indiana State Department of Health



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Treatment and Management of Tuberculosis Disease

Anti-Tuberculosis Drugs and Dosages for Adults (A) and Children (C)

Drug	Daily (max)	2X Weekly (max)	3X Weekly (max)	Adverse Reactions
INH	A: 5 mg/kg (300 mg) C: 10-15 mg/kg (300 mg)	A: 15 mg/kg (900 mg) C: 20-30 mg/kg (900 mg)	A: 15 mg/kg (900 mg) C: not recommended	Hepatic enzyme elevation; hepatitis; peripheral neuropathy; fatigue
RIF	A: 10 mg/kg (600 mg) C: 10-20 mg/kg (600 mg)	A: 10 mg/kg (600 mg) C: 10-20 mg/kg (600 mg)	A: 10 mg/kg (600 mg) C: not recommended	Orange discoloration of urine and secretions; rash; bleeding problems; GI upset; hepatitis, RIF reacts with birth control pills, methadone, warfarin, most NNRTIs and PIs; but may be used with NRTIs
RPT	A: 10 mg/kg (600 mg) with INH 900 mg once weekly during the continuation phase. Not approved for use in children			
RFB	A: 5 mg/kg (300 mg) C: unknown	A: 5 mg/kg (300 mg) C: unknown	A: 5 mg/kg (300 mg) C: unknown	
PZA	A: see table on back C: 15-30 mg/kg (2.0g)	A: see table on back C: 50 mg/kg (2.0g)	A: see table on back C: not recommended	GI upset; hepatitis; hyperuricemia; arthralgia; rash
EMB	A: see table on back C: 15-20 mg/kg (1.0 g)	A: see table on back C: 50 mg/kg (2.5 g)	A: see table on back C: not recommended	Optic neuritis (↓visual acuity & red-green color discrimination)

INH = isoniazid; RIF = rifampin; RPT = rifapentine; RFB = rifabutin; PZA = pyrazinamide; EMB = ethambutol; NRTIs = nucleoside reverse transcriptase inhibitors; NNRTIs = non-nucleoside reverse transcriptase inhibitors; PIs = protease inhibitors

Tuberculosis (TB)
Back

Standard Treatment Regimens for TB Disease Caused by Drug Susceptible Organisms

Initial Phase			Continuation Phase		Total Doses	Comments
Regimen	Drugs	Interval and Total Doses	Drugs	±Interval and Doses	Range of Doses	**Must treat for 39 weeks if PZA cannot be used**
1	INH RIF PZA EMB	7 days/wk for 14 doses (2 wks) then 2 x wk for 12 doses (6 wks) **Or** 5 days/wk for 10 doses (2 wks) then 2 x wk for 12 doses (6 wks)	INH RIF	2 x wk± for 36 doses (18 wks) §2 x wk± for 62 doses (31 wks)	62 **or** 58 (26 wks) §88 **or** 84 (39wks)	Preferred regimen in Indiana. Must use DOT. May use 5 days/week dosing if 7 days/week is not possible. Daily dosing for the duration of the Initial Phase is acceptable, **but not preferred**. Initial Phase and Total Doses would need to be adjusted accordingly (7 days/wk for 56 doses Initial Phase; 5 days/week for 48 doses Initial Phase)
2	INH RIF PZA EMB	3 x wk for 24 doses (8 wks)	INH RIF	3 x wk for 54 doses (18 wks) § 3 x wk for 93 doses (31 wks)	78 doses (26 wks) §117 doses (39 wks)	Must be used with DOT Not recommended for children
3	INH RIF PZA EMB	7 days/wk for 56 doses (8 wks) **Or** 5 days/wk for 40 doses (8 wks)	INH RIF	7 days/wk for 126 doses **Or** 5 days/wk for 90 doses (18 wks) §7 days/wk for 217 doses **Or** 5 days/wk for 155 doses (31 wks)	182 or 130 doses (26 wks) §273 or 195 doses (39 wks)	May use 5 days/week daily dosing only if 7 days/week is not possible. DOT must be used.

Suggested PZA & EMB Doses for Adults Weighing 40-90 Kg, Using Whole Tablets

PZA Doses	Weight (Kg)*			EMB	Weight (Kg)*		
	40-55	**56-75**	**76-90**		**40-55**	**56-75**	**76-90**
Daily	1000 mg	1500 mg	2000 mg*	**Daily**	800 mg	1200 mg	1600 mg**
(mg/kg)	18.2-25.0	20.0-26.8	22.2-26.3	(mg/kg)	14.5-20.0	16.0-21.4	17.8-21.1
3X Week	1500 mg	2500 mg	3000 mg**	**3X Week**	1200 mg	2000 mg	2400 mg**
(mg/kg)	27.3-37.5	33.3-44.6	33.3-39.5	(mg/kg)	21.8-30.0	26.7-35.7	26.7-31.6
2X week	2000 mg	3000 mg	4000 mg**	**2X week**	2000 mg	2800 mg	4000 mg**
(mg/kg)	36.4-50.0	40.0-53.6	44.4-52.6	(mg/kg)	36.4-50.0	37.3-50.0	44.4-52.6

±2 x wk dosing is contraindicated for HIV-infected patients with CD4 lymphocyte counts < 100 cells/µl.
§ Patients with cavitation on initial chest radiograph or CT scan and positive cultures at completion of 8 wks of Initial Phase therapy should receive a 31 week Continuation Phase therapy (see table above for number of doses). * Based on estimated lean body weight. ** Maximum dose regardless of weight.
EMB may be used at 15 mg/kg in young children with proven or suspected resistance to INH or RIF.
Drug doses **should not** be divided. Standard daily adult doses for INH and RIF: INH 300 mg, and RIF 600 mg. 1/09

Regimen Completion Timeframes

- All 6 - month regimens should be completed within 9 months
  - Initial 2 - month phase within 3 months
  - 4 - month continuation phase completed within final 6 months
- All 9 - month regimens should be completed within 12 months
  - Initial 2 - month phase within 3 months
  - 7 - month continuation phase within remaining 9 months (CDC, 2009, p. 4)

CDC Definition of completion of treatment:

- ATS/CDC recommended regimen
  - 4 acceptable regimens with some variations
  - Completion based on **ingestion of doses** – not months or weeks of treatment
- Ingestion within 12 months
  - Calculations exclude patients with initial isolate resistant to rifampin and children with meningeal, bone, joint or miliary TB (CDC, 2009, p. 3)

Determining Completion of Treatment

- Completion of treatment is defined by the number of doses ingested within a specified timeframe
- Treatment not solely based on months and weeks of treatment (CDC, 2009, p. 3)

Definitions

- Latent tuberculosis infection(LTBI)-
- Active case or Tuberculosis (TB) disease-
- DOT-Every dose observed by healthcare worker or designated person (CDC, 2009, p. 4)

Case Study #2

Perfect Patient, Sally Hernandez , daughter of active case Phyllis Hernandez. Sally complained of having a cough for over 3 weeks and recently been able to effortlessly lose weight. Sally's TST was 22 mm, CXR abnormal, non-cavitary, Smear (+), and Culture (+). Sally is also unemployed. She is from Mexico and immigrated to the US in 2007.

Weight= 105 lbs

Kilograms=

Case Study #2

TB Treatment script

Name: Sally Hernandez
Date: 4/1/2009

INH 300 mg po qd

RIF 600 mg po qd

PZA 1000 mg po qd

EMB 800 mg po qd

2 wks qd (14 doses)

Followed by:

Case Study #2

TB Treatment script

Name: Sally Hernandez
Date: 4/1/2009

INH 900 mg po

RIF 600 mg po

PZA 2000 mg po

EMB 2000 mg po

2 x wks x 6 wks

Case Study #2

Start Date of initial phase: 4/1/2009

Sally Hernandez was pan sensitive or drug susceptible.

Sally Hernandez was culture (-) within 2 months.

Case Study #2

Start date of Continuation phase:

INH 900 mg 2 x wk

RIF 600 mg 2 x wk

No missed doses and DOT

TB Tips!

- 6 months=26 weeks
- 9 months=39 weeks
- Initial phase = 2 months or 8 weeks
- Continuation phase = 18 weeks (standard)
  (CDC, 2009, p. 5)
- Directly observed therapy (DOT) is a standard of care in Indiana.

Case Study #3

Pregnant patient, Donna Summers, best friend of active case Chevy Chase. Donna complained of night sweats and having a fever. Donna's TST was 10 mm, CXR cavitary, Smear (+), and Culture (+). Donna works full time at her local department store.

Weight= 133 lbs

Kilograms=

Case Study #3

TB Treatment script

Name: Donna Summers
Date: 9/14/2009

INH 300 mg po

RIF 600 mg po

EMB 1200 mg po

Vit. B_6 50 mg po

qd x 2 wks 14 doses

Followed by:

Case Study #3

TB Treatment script

Name: Donna Summers
Date: 9/14/2009

INH 900 mg po

RIF 600 mg po

EMB 2800 mg po

Vit. B_6 50 mg po

2 x wk x 6 wks

Case Study #3

Start Date of initial phase:

Donna Summers was pan sensitive or drug susceptible.

Donna Summers was culture (-) within 2 months.

Case Study #3

End of initial phase:

Baby born on Nov. 19, 2009

Missed one week-birth (2 doses)

What is the length of treatment in the continuation phase?

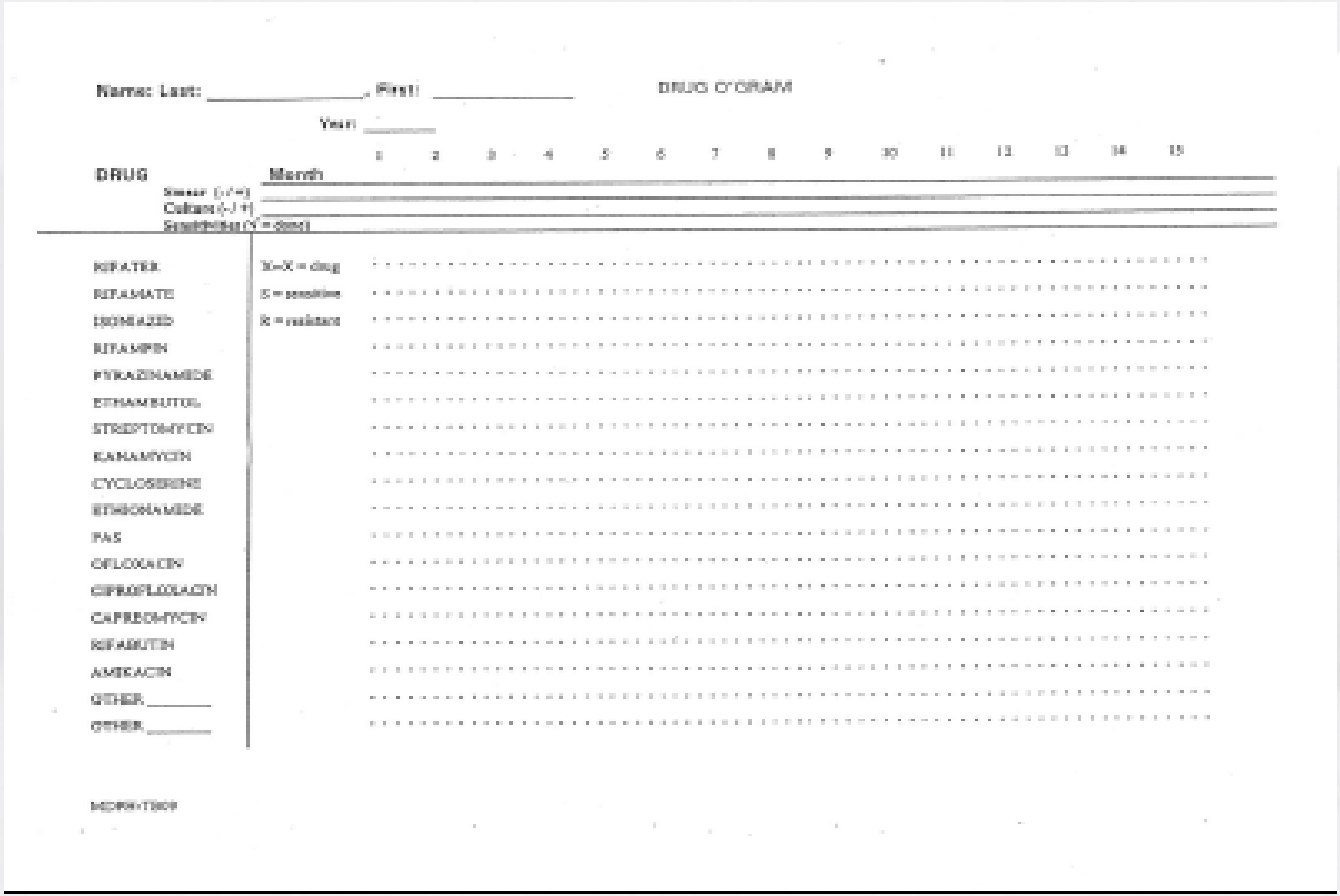
INH 900 mg po 2 x wk

RIF 600 mg po 2x wk

No more missed doses

All doses were done under DOT

Drug O'Gram



Name: Last: _____, First: _____ DRUG O'GRAM

Year: _____

DRUG	Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Smear (-/+)																
Culture (-/+)																
Susceptibility (S = dose)																
RIFATER	S=X = drug															
RIFAMATE	S = sensitive															
ISONIAZID	R = resistant															
RIFAMPIN																
PYRAZINAMIDE																
ETHAMBUTOL																
STREPTOMYCIN																
KANAMYCIN																
CYCLOSERINE																
ETHIONAMIDE																
PAS																
OFLOXACIN																
CIPROFLOXACIN																
CAPREOMYCIN																
RIFABUTIN																
AMIKACIN																
OTHER _____																
OTHER _____																

MDPH-TB09

Drug O'Gram

To be used when there is any deviation from the regular medication regimen; such as multidrug-resistant TB (MDR TB) cases, non-compliant cases, and lost to treatment cases. It is designed to let you evaluate the drug regimen at a glance.

Case Study #4 (Drug O'Gram)

A 22 year old female from Mexico arrived in the US in 2003. She presented at the hospital emergency room on August 9, 2007 with the following symptoms: cough, fever, fatigue, and chest pain. She had a 30 mm TST and a cavitary CXR. She was smear positive and later culture positive.

Case Study #4 (Drug O'Gram)

On August 9, 2007 a four drug regimen plus vit. B_6 was started, it continued until November 15, 2007 when susceptibilities found her to be INH and Rifampin resistant. On November 20, 2007 a new regimen of PZA, EMB, moxifloxacin, cycloserine --bid and amikacin 3 x wk and vit. B_6 was started .

Case Study #4 (Drug O'Gram)

She followed this treatment for approximately four weeks and at the end of this time she found out she was pregnant. Also, around the same time CDC reported that she is susceptible to INH. On December 11, 2007 moxifloxacin and amikacin were discontinued and PAS was added.

Case Study #4 (Drug O'Gram)

While the patient was pregnant she stayed on the following treatment plan and it continued for a full year (2008). The plan included INH, PZA, EMB, cycloserine--bid. PAS q 12 h and vit. B_6. PAS was discontinued on March 19, 2008 due to an elevated TSH.

On August 1, 2008 the patient delivered a healthy baby and started breastfeeding. In October 2008 the patient stopped breastfeeding and December 16, 2008 moxifloxacin was started again.

Case Study #4 (Drug O'Gram)

In 2009 the following medications were used:

INH, PZA, EMB, moxifloxacin, and vit. B_6. This regimen continued until May 5, 2009 when all medications were discontinued.

Name: Last: _____ First: _____ DRUG DIAGRAM

Year: 2007

| = start
X = stop

DRUG	Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
									Aug	Sept	Oct	Nov	Dec			
	Smear (-/+)															
	Culture (-/+)															
	Susceptibility (+ data)															
RIFATER	X=X-drug															
RIFAMATE	S = sensitive															
ISONIAZID	300mg															
RIFAMPIN	600mg															
PYRAZINAMIDE	1500mg															
ETHAMBUTOL	1200mg															
STREPTOMYCIN																
KANAMYCIN																
CYCLOSERINE	250 BID															
ETHIONAMIDE																
PAS																
OFLOXACIN																
CIPROFLOXACIN																
CAPREOMYCIN																
RIFABUTIN																
AMIKACIN 3x/wk	900 mg															
OTHER 50mg/	400mg															
OTHER B6	25mg															

Pregnancy

MDPH-TB09

Name: Last: _____, First: _____

DRUG O'GRAM

| = start
X = stop

Year: 2008

DRUG	1 Month Jan	2 Feb	3 Mar	4 Apr	5 May	6 June	7 July	8 Aug	9 Sept	10 Oct	11 Nov	12 Dec	13	14	15
Smear (-/+)															
Culture (-/+)															
Sensitivities (S = done)															
RIFATER	X=X = drug														
RIFAMATE	S = isolate														
ISONIAZID	x 300mg														
RIFAMPIN															
PYRAZINAMIDE	1500mg														
ETHAMBUTOL	1200mg														
STREPTOMYCIN															
KANAMYCIN															
CYCLOSERINE	250BID											X 12-16			
ETHIONAMIDE															
PAS	6gm Q6h					X 3-19 ↑TSH									
GELOXACIN															
CIPROFLOXACIN															
CAPREOMYCIN															
RIFABUTIN															
AMIKACIN															
OTHER Mac	400mg											12-16			
OTHER Bx	25mg														

MDPH-TB07

Name: Last: _____ First: _____ DRUG O'GRAM

Year: 2009

I = start
X = stop

DRUG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Month	Jan	Feb	Mar	Apr	May										
Smear (-/+)															
Culture (-/+)															
Susceptibles (X = dose)															
RIFATER	X=X = drug				I										
RIFAMATE	S = positive				S										
ISONIAZID	R = 300mg				X										
RIFAMPIN															
PYRAZINAMIDE	1500mg				X										
ETHAMBUTOL	1200mg				X										
STREPTOMYCIN															
KANAMYCIN															
CYCLOSERINE															
ETHIONAMIDE															
PAS															
OFLOXACIN															
CIPROFLOXACIN															
CAPREOMYCIN															
RIFABUTIN															
AMIKACIN															
OTHER: Moxi	400mg														
OTHER: B6	25mg														

MDPH-TB09

True or False

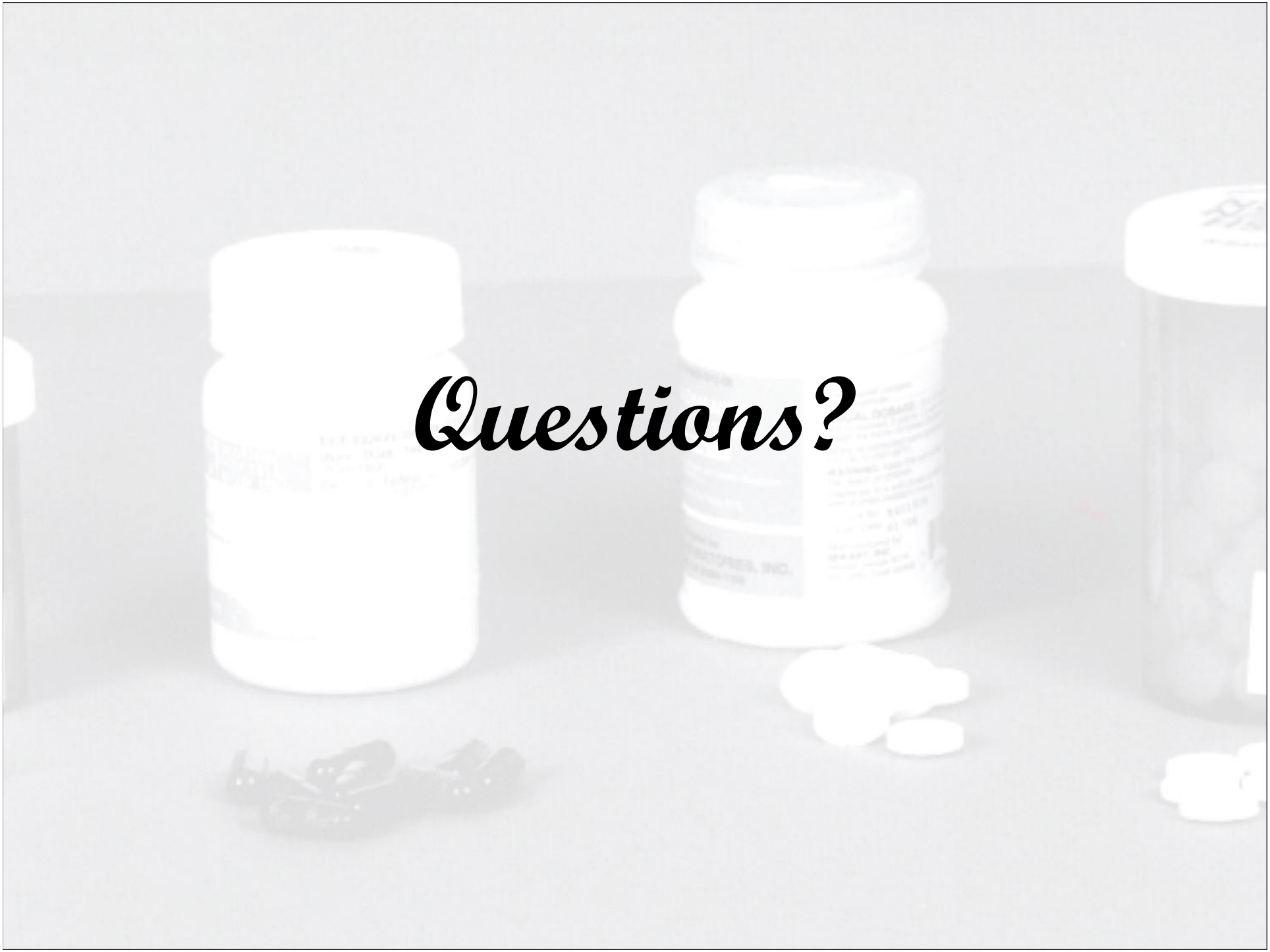
1. Treatment completion is defined by the number of doses ingested, as well as the duration of treatment administration
2. There are two phases of treatment, the initial and the continuation phase
3. The initial phase of treatment is always two months duration
4. The continuation phase of treatment varies

True or False

5. Directly observed therapy (DOT) is only used for active cases
6. Family members can do DOT
7. Patients can split doses throughout the day

Discussion

- Barriers to Dosage Counting


Questions?

Refereneces

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